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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/725,933	12/03/2003	Wen-Kun Yang	HK9225US	4487

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EXAMINER	
ZARNEKE, DAVID A	
ART UNIT	**PAPER NUMBER**
2891	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/725,933	YANG ET AL.	
	Examiner	Art Unit	
	David A. Zarneke	2891	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 March 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *30,31,36-41 and 48* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *30,31,36-41 and 48* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

Applicant's arguments with respect to the claims has been considered but are moot in view of the new ground(s) of rejection.

First, it is argued that Gengel teaches fluidic self-assembly while the present claims recite using pick-and-place to adhere a die onto the substrate.

Please note that: (1) the claims don't recite pick-and-place to adhere a die onto the base. All that is claimed is a die adhered to the base. Therefore, any method can be used to adhere the die to the base, including fluidic self-assembly; and (2) these are product claims, therefore process limitations can not be read into the claims. Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." In re Thorpe, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985).

Second, it is argued that a cavity or recess is not recited in the present claims and therefore Gengel's teaching of forming a cavity or recess teaches away from the claimed invention.

Again, this essentially is a process limitation. In a product claim, all that is given patentable weight is the final structure. Whether the die is attached first and then the

first dielectric is formed around it or the first dielectric is formed with a cavity and the die is depositing into the cavity is irrelevant. The final structure of both processes is the same. Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." In re Thorpe, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985).

Further, the claims now require the base doesn't have a die receptor cavity.

Third, it is argued that Gengel's teaching of a fructo-pyramidal shaped die teaches away from the rectangular shape of the present invention.

Please note that the present claims don't place any limitation upon the shape of the die. Therefore, any shaped die can be used to meet the limitations of the claims. Further, barring some showing of unexpected results, it would have been obvious to one of ordinary skill in the art to use any shape for the die.

Fourth, it is argued that the recitation of using a UV or heat curing material for the first and second dielectric material in claim 36 is not meet because the materials used in Gengel aren't UV or heat curable materials.

Please note that silicon dioxide is known to be cured using heat and/or UV. Silicon dioxide is usually formed by depositing TEOS or SOG and curing these using heat to form silicon dioxide.

Fifth, it is argued that the claims require a contact conductive layer and a separate conductive line while Gengel teaches depositing both at the same time. As noted above, this is a product-by-process limitation. Looking at the final structure, one could not determine if the 2 layers were deposited separately or simultaneously. Particularly since they both can be made of the same material, as pointed out in the third paragraph of page 7 of the remarks section dated 3/5/07. Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." In re Thorpe, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985)

Sixth, it is argued that the rejection's statement that it would be obvious to separate the single step of forming both the contact conductive layer and the conductive line simultaneously into two separate steps is improper because the contact conductive layer acts as a buffer and adhesion layer between the pads and the conductive line.

Please note that: (1) it would still act as a buffer, whether deposited simultaneously or separately because the layer is still present and can be made of the same material as the conductive line; and (2) this is a product-by-process limitation. Looking at the final structure, one could not determine if the 2 layers were deposited separately or simultaneously. Particularly since they both can be made of the same material, as pointed out in the third paragraph of page 7 of the remarks section dated

3/5/07. Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." In re Thorpe, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985).

Seventh, it is argued that the present invention requires the conductive line to substantially fill the opening in the dielectric while Gengel teaches a gap between the lines.

Please note that this is an obvious equivalent method of filling an opening. A skilled artisan would consider the partial filling of Gengel and the complete filling of the present invention as equivalent techniques used to fill an opening in a dielectric with a conductive layer. The substitution of one known equivalent technique for another may be obvious even if the prior art does not expressly suggest the substitution (Ex parte Novak 16 USPQ 2d 2041 (BPAI 1989); In re Mostovych 144 USPQ 38 (CCPA 1964); In re Leshin 125 USPQ 416 (CCPA 1960); Graver Tank & Manufacturing Co. V. Linde Air Products Co. 85 USPQ 328 (USSC 1950).

The last argument presented is that the claims require the bump to be <u>on</u> the conductive line while Gengel teaches forming the bump <u>adjacent to</u> the conductive line.

Please note that the word "on" doesn't necessarily mean "on top of", as seen in the Yourdictionary.com printout included herewith. "On" can mean "attachment to" or "in

contact with", as seen in the first several definitions. In view of these definitions, this limitation is met by Gengel.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 30, 31 and 34-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gengel, US Patent 6,417,025.

Gengel (figure 4A-4N) teaches a fan out type package structure, comprising:

an isolating base [406] without a die receptor cavity formed therein;

a die [410] adhered on said base;

a first dielectric layer [404] formed on said base and filling in a space except said first die on said base;

a second dielectric layer [412] formed on said first dielectric layer and said first die, wherein said second dielectric layer includes an opening [414];

a contact conductive layer [416] formed on pads of said die and within said opening to electrically couple with said pads, respectively;

conductive lines [416] formed on said second dielectric layer and said contact conductive layer substantially filling said opening, and said conductive lines extended out from corresponding said contact conductive layer to corresponding end points, wherein said corresponding end points are inside a surface of said second dielectric layer;

an isolation layer [420] formed on said conductive lines and said second dielectric layer; and

solder balls [424] passing through said isolation layer and welded on said conductive lines for coupling said conductive lines, respectively.

Regarding the limitation of the contact conductive layer and the conductive lines are both presumed to be separate layers. While Gengel fails to teach the use of two separate layers, the transposition of process steps or the splitting of one step into two, where the processes are substantially identical or equivalent in terms of function, manner and result, was held to not patentably distinguish the processes [Ex parte Rubin 128 USPQ 440 (PTOBdPatApp 1959)]. It would have been obvious to one of ordinary skill in the art at the time of the invention to use the two separate steps in the invention of Gengel because one can better control the flow of the conductive material into the opening when performed separately.

Further, in a product claim, only the final structure is considered. Therefore, how one arrived at a structure wherein the contact conductive layer and the conductive lines are formed is not given any patentable weight. All that is required is a structure having a contact conductive layer in an opening and a conductive line coupled thereto. The fact that Gengel teaches forming them at the same time and the claims intend to have them formed separately is not given any patentable weight. Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." In re Thorpe, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985).

With respect to the limitation that the contact conductive layer substantially fill the opening, the partial filling of the opening taught be Gengel and the presently claimed substantially filled opening are equivalent techniques used to form a contact in an opening in order to electrically connect the underlying pad to the conductive line formed above the contact conductive layer. They are interchangeable techniques used to perform this function. The substitution of one known equivalent technique for another may be obvious even if the prior art does not expressly suggest the substitution (Ex parte Novak 16 USPQ 2d 2041 (BPAI 1989); In re Mostovych 144 USPQ 38 (CCPA 1964); In re Leshin 125 USPQ 416 (CCPA 1960); Graver Tank & Manufacturing Co. V. Linde Air Products Co. 85 USPQ 328 (USSC 1950).

Regarding claim 31, Gengel teaches the surfaces of said first dielectric layer and said first die are at same level (figure 4N).

With respect to claim 34, while Gengel fails to teach the said first die is formed by sawing a processed base, this is a product-by-process limitation. Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." In re Thorpe, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985). Further, acquiring a die from a process that saws the die from a base is conventionally known in the art.

As to claim 35, while Gengel fails to teach said processed base is back lapped to get a thickness of said processed base around 50-300 um, back-lapping is a product-by-process limitation. Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." In re Thorpe, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985). Therefore, all this claim requires is the die to be around 50-300 um thick. As seen in the drawings, the first dielectric layer [404] is the same height as the die. Gengel teaches the first dielectric layer [404] is about 50 microns thick (4, 10+). Therefore, the die must be about 50 microns thick. Further, it would have been obvious to one ordinary skill in the art at the time of the invention to optimize the thickness of the die (MPEP 2144.05).

In re claim 36, Gengel teaches the first dielectric layer is made of silicon dioxide (4, 9+) and said second dielectric layer is made comprise UV curing type material, heat curing type material, and the combination thereof (5, 40+). The use of a UV curing type material, heat curing type material, and the combination thereof as the first dielectric layer as opposed to silicon dioxide would have been obvious to one of ordinary skill in the art because they are equivalent materials known to be used as a dielectric in the forming of an interconnect. The substitution of one known equivalent technique for another may be obvious even if the prior art does not expressly suggest the substitution (Ex parte Novak 16 USPQ 2d 2041 (BPAI 1989); In re Mostovych 144 USPQ 38 (CCPA

1964); In re Leshin 125 USPQ 416 (CCPA 1960); Graver Tank & Manufacturing Co. V. Linde Air Products Co. 85 USPQ 328 (USSC 1950).

Regarding claim 37, Gengel teaches said first contact conductive layer comprises Ti, Cu, and the combination thereof (5, 63+).

With respect to claim 38, Gengel teaches said first conductive lines comprise Ni, Cu, Au, and the combination thereof (5, 63+).

As to claim 39, while Gengel, which teaches a thermally conductive (4, 9+ & 18+) isolating base, fails to teach a material of said isolating base is glass, silicon, ceramic, or crystal material, it would have been obvious to one of ordinary skill in the art at the time of the invention to use an isolating base made of glass, silicon, ceramic, or crystal material because all of these materials are commonly known materials used as an isolation base. The substitution of one known equivalent technique for another may be obvious even if the prior art does not expressly suggest the substitution (Ex parte Novak 16 USPQ 2d 2041 (BPAI 1989); In re Mostovych 144 USPQ 38 (CCPA 1964); In re Leshin 125 USPQ 416 (CCPA 1960); Graver Tank & Manufacturing Co. V. Linde Air Products Co. 85 USPQ 328 (USSC 1950).

In re claim 40, while Gengel fails to teach an epoxy layer formed on back surface of the base, it would have been obvious to one of ordinary skill in the art at the time of the invention to form an epoxy layer on the back of the base because it is conventionally known in the art. A skilled artisan would form an epoxy layer on the back of the base in order to protect the base during the dicing process. The use of conventional materials to perform there known functions in a conventional process is obvious (MPEP 2144.07).

Regarding claim 41, while Gengel teaches the isolating layer is made of silicon dioxide, it would have been obvious to one of ordinary skill in the art at the time of the invention to use an epoxy, resin or combinations thereof as the isolating layer in the invention of Gengel because they are equivalent materials known to skilled artisans to be used in this manner. The substitution of one known equivalent technique for another may be obvious even if the prior art does not expressly suggest the substitution (Ex parte Novak 16 USPQ 2d 2041 (BPAI 1989); In re Mostovych 144 USPQ 38 (CCPA 1964); In re Leshin 125 USPQ 416 (CCPA 1960); Graver Tank & Manufacturing Co. V. Linde Air Products Co. 85 USPQ 328 (USSC 1950).

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

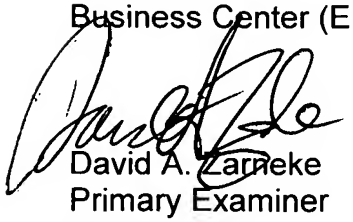
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David A. Zarneke whose telephone number is (571)-272-1937. The examiner can normally be reached on M-Th 7:30 AM-6 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, William Baumeister can be reached on (571)-272-1722. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



David A. Zarneke
Primary Examiner
May 1, 2007